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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/996,695	11/30/2001	Otto Z. Zhou	032566-018	1828

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EXAMINER	
MAYEKAR, KISHOR	
ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 06/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/996,695	ZHOU ET AL.	
	Examiner	Art Unit	
	Kishor Mayekar	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *74-77 and 79-173* is/are pending in the application.

4a) Of the above claim(s) *79-97* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *74-77 and 98-173* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *05/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: blanks left out in some of the prior art references referred to in pages 1, 2 and 8.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 98-127 and 173 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The first

set of new claims 98-112 recites that a suspension contains an adhesion promoting material in a liquid medium, wherein the adhesion promoting material comprises a carbon-dissolving material selected from the group consisting of nickel, iron, cobalt and manganese. The recited carbon-dissolving material is a new matter because the specification as originally filed does not provide the support for it. The same is applied to the added limitation of the adhesion promoting material comprised of the recited carbide-forming material as claimed in the second set of claims 113-127 and to the added limitation of the adhesion promoting material comprised of the recited low melting point material.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 74, 75 and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russ et al. (US 6,342,755). Russ' invention is directed to a process for manufacturing a field emission cathode by an electrophoretic deposition. Russ discloses that the deposition comprises providing a particle

loaded deposition bath comprising a plurality of particles of an electron emitting material, a plurality of particles of an insulating material, a hydrophilic alcohol, water and a charger (see abstract), wherein the emitting particles include elemental metals, silicon and forms of carbon and are of particle size between 0.05 to 20 μm (col. 2, lines 15-23); wherein the insulating particles include oxides and carbides and are of particle size of a quarter or a half of that of the emitting particles (col. 2, lines 24-30); wherein the charger includes $Mg(NO_3)_2$ (col. 2, lines 47-49); and wherein the deposition is performed with a direct current (col. 6, lines 1-5). The differences between Russ and the above claims are i) the use of carbon nanotubes or nanowires as the nanostructure-containing material and ii) the suspension containing both the nanostructured material and the metal.

As to the first difference, since Russ' particles are particles of nanostructure-containing materials and include forms of carbon and oxide, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Russ' teachings because the selection of any of known equivalent forms of carbon, silicon or oxide as particles in Russ would have been within the level of ordinary skill in the art.

As to the second difference, because Russ discloses the suspension contains

particles of metals such as tin and forms of carbon, and because it has been held that "it is a prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition which is to be used for the very same purpose." *In re Kerkhoven* 205 USPQ 1069; *In re Susi* 169 USPQ 423; *In re Crockett* 126 USPQ 186.

As to the subject matter of claim 77, Russ discloses in col. 5, lines 5-24 that the dissolved charging salt when reacted water (1-30 v%) serves as binder.

6. Claim 76 is rejected under 35 U.S.C. 103(a) as being unpatentable over Russ '755 as applied to claims 74, 75 and 77 above, and further in view of Choi et al. (US 6,616,497). The difference between Russ and the instant claim is the provision of shortening the length of carbon nanotubes prior to their introduction into the suspension. Choi shows in a process for manufacturing a field emitter by electrophoretic deposition the above limitation (col. 4, lines 13-17). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Russ' teachings as shown by Choi because this would result in preparing the carbon nanotubes prior to their introduction into the suspension.

7. Claims 74, 75 and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 989,579 A2 in view of Russ '755. EP '579's invention is directed to a device containing adhering carbon nanotube films and a method for fabricating the device. EP '579 discloses in [0028] that the nanotube film is formed by an electrophoretic deposition from a solution containing carbon nanotube particles and optionally conductive particles of elemental metals with solvents and binders followed by annealing in air, vacuum or inert atmosphere. The differences between EP '579 and the above claims are the provision of the recited metals and a charger to the solution.

As to the first difference, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified EP '579's teachings because the selection of any of known equivalent elemental metals to promote adhesion would have been within the level of ordinary skill in the art.

As to the second difference, Russ as applied above shows the limitation. The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified EP '579's teachings

as shown by Russ because this would result in imparting an electrical charge to the particles.

8. Claim 76 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP '579 as modified by Russ '755 as applied to claims 74, 75 and 77 above, and further in view of Choi '497. The difference between the references as applied above and the instant claim is the provision of shortening the length of carbon nanotubes prior to their introduction into the suspension. Choi shows in a process for manufacturing a field emitter by electrophoretic deposition the above limitation (col. 4, lines 13-17). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the references" teachings as shown by Choi because this would result in preparing the carbon nanotubes prior to their introduction into the suspension.

9. Claims 128 and 130-140 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 989,579 A2 in view of Russ '755, Shiue et al. (US 6,462,935 B1) and/or De Jaeger et al. (US 5,296,117). EP '579 as applied above further discloses in [0028] the use of binders in the solution. Shiue shows in a free-

standing flow-through capacitor that a coating paste containing nanoparticles binder of polyvinyilidene fluoride (col. 3, lines 58-61 and col. 6, lines 60 though col. 7, line 1). De Jaager shows in a process of electrophoretically depositing particle the use of binder in addition to a charger (paragraph crossing cols. 10 and 11). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified EP '579's teachings as suggested by Shiue and/or De Jaeger because this result in fixing the particles and the selection of any of known equivalent organic resin binder would have been within the level of ordinary skill in the art.

As to the subject matter of claim 130, EP '579 discloses it in [0026].

As to the subject matter of claim 131, EP '579 discloses it in [0027].

As to the subject matter of claims 133, Russ shows a concentration within the recited range in Examples and col. 5, lines 25-67.

As to the subject matter of claims 135, Russ shows an electric field within the recited range (col. 6, lines 1-11).

As to the subject matter of claim 137, EP '579 discloses it in [0028] and [0027].

10. Claim 129 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP '579 as modified by Russ '755, Shiue '935 and/or De Jaeger '117 as applied to claims 128 and 130-140 above, and further in view of Choi '497. The difference between the references as applied above and the instant claim is the provision of shortening the length of carbon nanotubes prior to their introduction into the suspension. Choi shows in a process for manufacturing a field emitter by electrophoretic deposition the above limitation (col. 4, lines 13-17). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the references" teachings as shown by Choi because this would result in preparing the carbon nanotubes prior to their introduction into the suspension.

11. Claim 141 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP '579 as modified by Russ '755, Shiue '935 and/or De Jaeger '117 as applied to claims 128 and 130-140 above, and further in view of either Friedman et al. (US 5,795,456) or Nemelka (US 6,319,381 B1). The difference between the references as applied above and the instant claim is the provision of masking step. Friedman shows in an electrophoretic deposition of particles the masking step (see

Summary of the Invention). Nemelka shows the same in an electrophoretic deposition of particles (see abstract). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the references' teachings as shown by either Friedman or Nemelka because this would result in patterning of the deposited films.

12. Claims 142-145 and 147-155 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 989,579 A2 in view of Russ '755, Shiue et al. (US 6,462,935 B1) and/or De Jaeger et al. (US 5,296,117), for the same reasons as applied in paragraph #9 above.

13. Claim 146 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP '579 as modified by Russ '755, Shiue '935 and/or De Jaeger '117 as applied to claims 142-145 and 147-155 above, and further in view of Choi '497, for the same reasons as applied in paragraph #10 above.

14. Claim 156 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP '579 as modified by Russ '755, Shiue '935 and/or De Jaeger '117 as applied to

claims 142-145 and 147-155 above, and further in view of Friedman '456 or Nemelka '381, for the same reasons as applied in paragraph #11 above.

15. Claims 157, 159-168 and 170 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 989,579 A2 in view of Russ '755. The references are applied as above in paragraph #7. As to the subject matter of precoating the substrate in the independent claim 157, EP '579 discloses it in [0027] and [0023].

16. Claim 158 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP '579 as modified by Russ '755 as applied to claims 157, 159-168 and 170 above, and further in view of Choi '497, for the same reasons as applied in paragraph #8 above.

17. Claim 169 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP '579 as modified by Russ '755 as applied to claims 157, 159-168 and 170 above, and further in view of Shiue et al. (US 6,462,935 B1) and/or De Jaeger et al. (US 5,296,117), for the same reasons as applied in paragraph #9 above.

18. Claim 171 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP '579 as modified by Russ '755, Shiue '935 and/or De Jaeger '117 as applied to claims 157, 159-168 and 170 above, and further in view of Friedman '456 or Nemelka '381, for the same reasons as applied in paragraph #11 above.

19. Claim 172 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP 989,579 A2 in view of Russ '755 and either Friedman '456 or Nemelka '381. The references are applied as above in paragraph #7. As to the subject matter of liquid medium comprising dimethyl formamide, Friedman shows that the use of an organic based solvent based system or water as a liquid medium in the electrophoretic deposition of particles (paragraph crossing cols. 10 and 11). Nemelka shows the same (col. 3, lines 62-65). a shows the same in an electrophoretic deposition of particles (see abstract). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the references' teachings as shown by either Friedman or Nemelka because the selection of any of known organic solvent based system in the electrophoretic deposition of particles would have been within the level of ordinary skill in the art.

Response to Arguments

20. Applicant's arguments filed 4 April 2006 have been fully considered but they are not persuasive because of the new grounds of rejection as set forth above.

Conclusion

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kishor Mayekar whose telephone number is (571) 272-1339. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-

direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kishor Mayekar
Primary Examiner
Art Unit 1753